ArevaEPRDCPEm Resource

From: Pederson Ronda M (AREVA NP INC) [Ronda.Pederson@areva.com]
Sent: Friday, August 14, 2009 2:59 PM
To: Tesfaye, Getachew
Cc: BENNETT Kathy A (OFR) (AREVA NP INC); DELANO Karen V (AREVA NP INC); WILLIFORD Dennis C (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 258, FSARCh. 9
Attachments: RAI 258 Response US EPR DC.pdf

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 258 Response US EPR DC.pdf" provides technically correct and complete responses to the 2 questions.

The following table indicates the respective pages in the response document, "RAI 258 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 258 — 09.01.01-22	2	2
RAI 258 — 09.01.01-23	3	3

This concludes the formal AREVA NP response to RAI 258, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

Ronda Pederson
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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Tuesday, July 14, 2009 7:58 PM
To: ZZ-DL-A-USEPR-DL
Cc: VanWert, Christopher; Lu, Shanlai; Donoghue, Joseph; Hearn, Peter; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 258 (3175), FSARCh. 9

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on July 7, 2009, and on July 14, 2009, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be

provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 731

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Subject: Response to U.S. EPR Design Certification Application RAI No. 258, FSARCh. 9
Sent Date: 8/14/2009 2:58:47 PM
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From: Pederson Ronda M (AREVA NP INC)

Created By: Ronda.Pederson@areva.com

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MESSAGE	2132	8/14/2009 2:58:49 PM
RAI 258 Response US EPR DC.pdf	68151	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
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Response to

Request for Additional Information No. 258 (3175), Revision 0

7/14/2009

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 09.01.01 - Criticality Safety of Fresh and Spent Fuel Storage and Handling
Application Section: 9.1.1

QUESTIONS for Reactor System, Nuclear Performance and Code Review (SRSB)

Question 09.01.01-22:

Tables 4.8.1 and 4.8.3 of technical report UN-TR-08-001 summarize the biases and uncertainties as they apply to the criticality analysis. Confirm that the CASMO uncertainties are included, and describe the inclusion of the CASMO uncertainties in the criticality analysis.

Response to Question 09.01.01-22:

Technical Report UN-TR-08-001 was submitted to the NRC for review in March 2008, which is prior to the February 26, 2009 NRC meeting regarding issues in spent fuel pool applications. The criticality analysis is therefore consistent with previous Holtec analyses that had been reviewed and approved by the NRC, most recently Crystal River 3 (ML072910317), that did not include a CASMO-4 bias or bias uncertainty. Since the submittal of UN-TR-08-001 for NRC review, Holtec has performed a validation of CASMO-4 in response to RAIs on Holtec analyses that were submitted after February 26, 2009. Based on those results, a conservative value was identified for the bias uncertainty of CASMO-4 of 0.0025 Δk. After combining the CASMO-4 bias uncertainty with the other uncertainties in the analysis, which are identified in Tables 4.8.1 and 4.8.3, the maximum multiplication factor, k_{eff}, increases marginally from 0.9151 to 0.9155 for the Region 1 racks and from 0.9450 to 0.9452 for the Region 2 racks. This very small effect eliminates the need to incorporate the CASMO-4 validation results into the technical report.

FSAR Impact:

Neither the U.S. EPR FSAR nor Holtec Technical Report UN-TR-08-001(P) will be changed as a result of this question.

Question 09.01.01-23:

Technical report UN-TR-08-001 uses burnup credit when analyzing spent fuel pool criticality. Describe the accounting for the uncertainties in the fission product and actinides in the calculations.

Response to Question 09.01.01-23:

Section 4.8.2.3 of Technical Report UN-TR-08-001 describes the accounting for the uncertainties in the fission products and actinides in the calculations:

> "Since critical experiment data with spent fuel is not available for determining the uncertainty in burnup-dependent reactivity calculations, an allowance for uncertainty in reactivity was assigned based upon other considerations. Based on the recommendation in [4-7], a burnup dependent uncertainty in reactivity for burnup calculations of 5% of the reactivity decrement is used. This allowance is statistically combined with the other reactivity allowances in the determination of the maximum k_{eff} for normal conditions where assembly burnup is credited."

This method is based directly upon the guidance provided in reference [4-7], i.e., the "Kopp memo", which states in Section 5.A.5.d:

> "A reactivity uncertainty due to uncertainty in the fuel depletion calculations should be developed and combined with other calculational uncertainties. In the absence of any other determination of the depletion uncertainty, an uncertainty equal to 5 percent of the reactivity decrement to the burnup of interest is an acceptable assumption." [emphasis added]

No effort has been made in this application to determine the magnitude of the depletion uncertainty. Therefore, in accordance with the guidance document, 5 percent of the reactivity decrement is used as recommended by the NRC as an "acceptable assumption." This method has been used and approved on practically every spent fuel pool criticality analysis that credits the reactivity decrement associated with depletion since the issuance of the Kopp memorandum. Additionally, the depletion parameters identified in Table 4.6.2 were selected to harden the spectrum, maximize plutonium production, and produce a fuel isotopic composition that maximizes the reactivity of spent fuel. This combination of utilizing conservative depletion parameters, following NRC guidance in the Kopp memorandum and performing calculations based on methods previously reviewed and approved by the NRC on multiple license applications, is an acceptable method for accounting for the uncertainties associated with the fission products and actinides.

It should also be noted that the validation of MCNP4a against fresh fuel UO_2 and MOX benchmark experiments includes those fissionable and fissile isotopes that contribute to the highest degree to the reactivity of either fresh or spent fuel, namely ^{235}U, ^{238}U, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{242}Pu. The bias and bias uncertainty from the MCNP4a validation against fresh fuel benchmark experiments is combined with the other uncertainties for the U.S. EPR spent fuel rack criticality analysis.

FSAR Impact:

Neither the U.S. EPR FSAR nor Holtec Technical Report UN-TR-08-001(P) will be changed as a result of this question.